SPECIFICATION

[Electronic Version 1.2.8]

[Fiber Optic Illuminator for Microscopes]

Background of Invention

[0001] 1. Field of the invention

[0002] The invention relates to the need to maximize the light-gathering efficiency and redirection of the radiation from omni directional light radiators for the purpose of illuminating specimens for optical analyses.

[0003] 2. Description of the prior art

[0004] A family of illuminators, e.g., hot filaments or arc lamps, are point source illuminators whose radiation patterns are only impeded by inherent mechanical support elements. In many applications, it is desirable to efficiently gather this radiated energy and redirect it along a desired optical axis. Common practice employs the use of reflective assemblies that gather the rearward radiations and refocus this energy in a manner that enhances the forward radiation pattern.

[0005] A typical application for this technique is in the field of microscope illumination. The forward radiation pattern is shaped by a reflector/collector lens system and is ultimately channeled to the specimen being observed. It is a critical necessity to attain the maximum transfer of light energy to the specimen.

[0006] In a conventional system, the light energy that does not impinge on the reflector, or, is not on the desired optical axis, is wasted to the local environment. The system herein described employs a unique fiber optic shroud that is able to capture a large percentage of this wasted energy and effectively increase the amount of light supplied to the specimen.

Summary of Invention

[0007] It is the object of this invention to provide an omni directional light source system that illuminates specimens for optical analyses.

[0008] It is another object of this invention to provide said illuminator with the ability to efficiently capture and utilize the unused spherical radiations of existing point source radiating systems.

[0009] It is a further object of this invention to provide a simple means to attenuate the intensity of the light supplied to the specimens without altering its spectral quality.

[0010] An advantage of the present invention is that the design of the light-capturing shroud removes the criticality of the positioning of the light source relative to the light-gathering elements that is inherently common to reflective/focussing systems.

Brief Description of Drawings

[0011] Figure 1 contains a top and a side view of the fiber optic shroud assembly.

[0012] Figure 2 depicts the vertical movement of the light source relative to the shroud assembly.

[0013] Figure 3 shows the vertical drive assembly and the optional light-powered energy panel.

Detailed Description

[0014] Figure 1 depicts the structure of the illuminator. It consists of a shroud 2 of optical fibers whose individual inputs 1 are nominally normal to the spherical radiation components of an omni directional light source. The fiber optic outputs are grouped and formed into a tight circular output bundle 3.

[0015] Figure 2 details an arrangement wherein a point source radiator 4 is placed inside said shroud. The vertical dimension of the shroud has a nominal height that results in a minimum angle of 60 degrees with a horizontal plane through the light source. (A design tradeoff exists between the amount of light from a larger capture area, the manufacturing ease and cost of additional optical fibers, and the need to provide adequate coolant flow.) The radiated light energy impinges on the inner surfaces of the shroud and is collected by the optical fibers. Conventional optical cable is subsequently employed to conduct the gathered light and to illuminate the specimen of interest.

[0016] To achieve an intensity control that does not alter the spectral quality of the light source, a vertical drive mechanism is employed. As the relative vertical position of the radiator to the internal surface of the shroud is changed, the optical coupling is correspondingly changed resulting in the desired intensity control. Figure 3 is a